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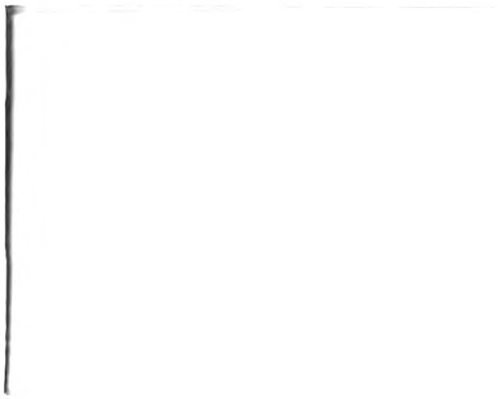

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VERY PRELIMINARY DRAFT
PLEASE DO NOT QUOTE

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I. Introduction[1]

While there have been numerous studies devoted to examining the impact of governmental training programs on workers who have experienced difficulties in the labor market, there has been remarkably little research on the actual occurrence and consequences of training provided by the private sector. This training for young workers has been estimated to potentially cost over $25 billion a year in the U.S.[2]. Apart from governmental training programs, the discussion of the role of human capital investments on wage determination has focused largely on schooling. Understanding the effect of schooling helps explain differences in levels of wages but does not go far in explaining shapes of wage profiles. Wage profiles instead may be explained by a variety of factors including post-schooling human capital investments. Unfortunately, while data on schooling is readily available, this type of data is not easily found on post-schooling investments. Consequently, few researchers have been able to examine directly the impact of private sector training on wages and many have had to infer the impact of this source of human capital from the shape of wage profiles. Given the potential long term consequences of training (or lack of) in the early years of a worker's labor market experience, it would be useful to have a better understanding of the early training experience of young workers and the long term impact of this on their wages.

Studies such as Mincer's (1974) fundamental work, Carmichael (1985), Chapman and Tan (1980), Hashimoto (1981), Ohashi (1983), Hanushek and Quigley (1985), and Gustman and Steinmeier (1981) have attempted to model, theoretically and/or empirically, the returns to on-the-job training and schooling. Most of these studies, however, have been constrained by the quality of the data available to them. In particular, there is little accurate information concerning the occurrence and especially the duration of private

sector training. In addition, there usually is not a complete history available on schooling status and labor market status. Some of the best empirical studies on the returns to private sector training include Mincer (1983), Brown (1983), Lillard and Tan (1986), Pergamit and Shack-Marquez (1986), and Barron et. al. (1987). Mincer uses data from the 1976-78 Panel Study of Income Dynamics, PSID, and data from the 1969 and 1971 Young Men's and Older Men's cohorts of the National Longitudianl Survey, NLS. The study by Brown (1983) uses data from the 1976 and 1978 PSID surveys while Lillard and Tan (1986) and Pergamit and Shack-Marquez (1986) analyze more recent data from the January 1983 Current Population Survey, CPS. Lillard and Tan also use data from various years of the NLS Young Men, Young Women and Older Men cohorts, and the 1980 Employment Opportunities Pilot Project. Finally, Barron et. al. use data from the employer EOPP survey on characteristics of the most recent hire. All of these studies, however, have different data limitations. Some of the more critical issues include the lack of complete employment, training and schooling histories on individuals in the various surveys, difficulties in actually measuring the amount of private sector training the respondent received, and problems in distinguishing firm-specific from general types of training. To highlight these problems, Table 1 shows the different questions used in each of these studies. Few of these questions actually ask about the training the respondent has acquired on the current and past jobs. For example, the question from the PSID on training is how long it took the "average" person to become qualified for the job, not how long the respondent actually took to become qualified. In the older NLS cohorts, training is measured as training received or <u>used</u> on the current job, therefore, one is not able to observe when the training actually took place or other types of training undertaken by the respondent. The lack of information on the timing

of training is also the case with the CPS data. In addition, if most training is concentrated during the early years of a worker's employment experience these questions will not pick up this training experience. The data used by Barron et. al. is interesting since it is a good measure of the "representative" costs of training to an employer. However, it is restricted to the most recent hire.

It is possible to overcome many of these problems using data from the new National Longitudinal Survey youth cohort. From this new data set one can estimate directly the impact of on-the-job training on wages and wage growth of young workers. The data is particularly good for identify spells of formal training. The following sections present the theoretical framework used to examine wage profiles, a description of the data used and a discussion of the results on the impact of OJT on wages and wage growth.

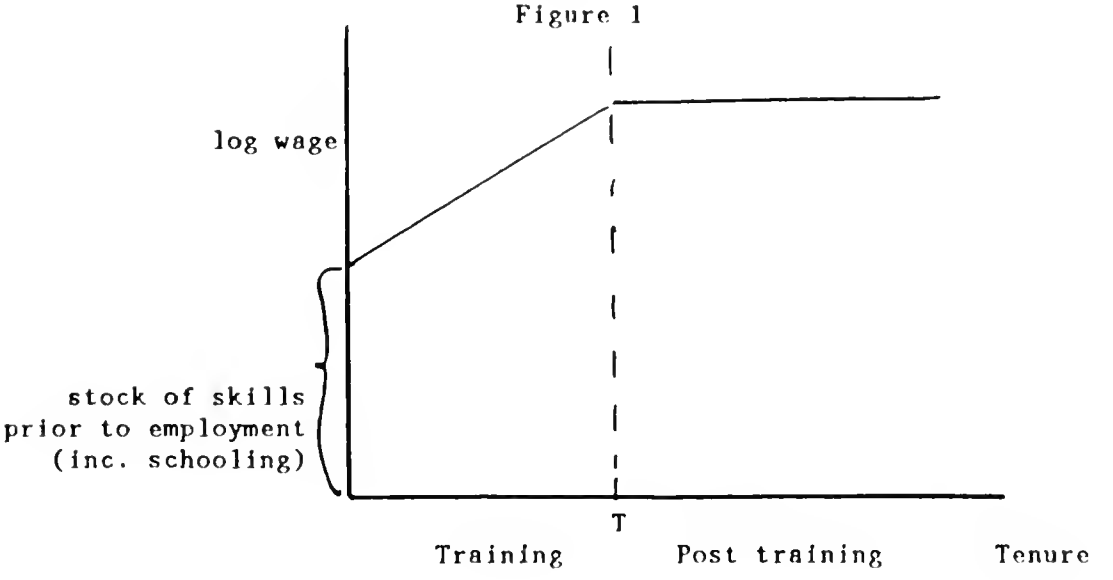
II. A Framework for the Analysis of the Impact of Training on Earnings

There are many explanations of individual variation in wages and wage profiles. In particular, there are several different explanations of why wage profiles are upward sloping. In Mincer's (1974) seminal work, wage profiles slope upwards as human capital or skills increase with experience. Therefore, as a worker acquires more on-the-job training there should be an increase in their productivity and consequently in their earnings. There have been several alternative explanations of upward sloping profiles that have little to do with the role of on-the-job training. Specifically, Stiglitz (1975) discusses how firms offer upward-sloping wage profiles to discourage "shirking" among workers. An alternative explanation (see Salop and Salop (1976) and Rothschild and Stiglitz (1978)) might be that firms use upward sloping profiles to discourage "movers" from seeking employment. Recent work by Abraham and Farber (1987), Altonji and Shakotko (1987), and Topel (1986) have examined the

importance of job matching in explaining upward sloping wage profiles. All of these alternative models and human capital theory are not necessarily mutually exclusive. In fact, we might believe that training is more likely to occur the more successful the job match. If so, it will be difficult to distinguish between matching and human capital models unless there is detailed information on quantities and timing of training. The potential relevance of the human capital story might be judged on the basis of the amount of wage growth explained by training versus that explained by other factors.

In the extreme human capital case we would expect an individual's wage profile to look like the following:

Figure 1



In other words, wages grow only during periods when an individual worker's productivity increases due to investments in human capital. As Mincer has discussed, if this is indeed what is really happening, the observed concavity of the tenure-wage profile is due to the completion of training. As Brown (1983) showed this simple model of wage determination can be generalized to take into account depreciation of skills, returns to training when training is

completed differing from the returns during spells of training, and factors other than training which might result in wage growth. There are a number of ways to begin to try to specify a wage equation to take these different factors into account. Extending Brown (1983) I estimate the following equations:

Eq. 1) $\log w_t = X'_t B + a_1 \text{schooling}_t + a_2$ previous general training $+ a_3$ previous OJT $+ a_4$ previous apprenticeship $+ a_5 D_1$ (OJT with current employer) $+ a_6 (1-D_1)$(current OJT) $+ a_7 D_2$ (Apprentice with current employer) $+ a_8 (1-D_2)$(current apprentice) $+ a_9$ current general training $+ a_{10}$ (tenure) $+ a_{11}$ work experience + dummy variables for whether or not the respondent has had OJT, general training and/or apprenticeship training

Eq. 2) as above except (a_{10} tenure-wks of training) rather than (a_{10} tenure)

X'_t is a vector of individual characteristics and other relevant factors for wage determination. $D_1 = 1$ if the respondent is in a spell of on-the-job training at time t and 0 otherwise. $D_2 = 1$ if the respondent is in a spell of apprenticeship training at time t and 0 otherwise. There is no quadratic term included for work experience and job tenure given the age of the sample. Equation 1 allows for non-training related wage growth but it becomes more difficult to infer wage growth exclusive of training spells. The advantage of the specification of equation (2) as discussed by Brown (1983) is that it measures growth of wages outside of spells of training. A drawback, however, is that there is no measure of non-training related wage growth <u>during</u> training. Nevertheless, these two equations together should give a sense of the importance of training relative to other factors.

One of the unique aspects of the NLS youth cohort data is that I have information on all training spells and it is possible to separate company training from apprenticeship training. This specification will also allow me to observe the degree of firm specificity of on-the-job training through the coefficient on previous OJT. If OJT is mainly general in nature for young workers one would expect a_3 to be positive and significant but if the training is more firm specific this coefficient should be insignificant. This specification, therefore, will examine the portability of training for young workers which has numerous policy implications.

III. The Data

The NLS youth cohort of 12,686 males and females (who were 14 to 21 years of age at the end of 1978) has some of the most comprehensive data on education, jobs, military service, training programs, marital status, health and attitudes of young workers. The respondents have been interviewed every year since 1979 on all aspects of their labor market experience. The response rate in 1985 was over 95% of the original cohort. The data on types of training (other than governmental training) received are some of the most comprehensive data available on private sector training. Some of the questions respondents were asked include what types of training they had received over the survey year (they are asked about all spells not just the longest), and dates of training periods by source. The training spells had to be at least four weeks in length to be included. Potential sources of training include business college, nurses programs, apprenticeships, vocational and technical institutes, barber or beauty school, a correspondence course, company training and other miscellaneous training. This final category of training seems to consist primarily of short term adult education courses taken in the evening and does not appear to be work related. All of these sources of training

should not be confused with any training received in a formal regular schooling program which is included in the schooling variable. However, given the way the questions are asked it may be possible that the respondents are giving information on formal training spells rather than more informal on-the-job training. For this reason, the tenure variable will be picking up not only returns to seniority but possibly returns to informal training as well.

Using a constructed weekly event history of private sector training, employment, and schooling it is possible to examine the patterns and outcomes of training for young U.S. workers.[3] Over the period of January 1978 through the respondent's interview date in 1983 almost a quarter of the entire sample of 12,686 youths have been involved in some sort of private sector training. For the analysis presented in this paper I have chosen a subsample of the 12,686 respondents. I have selected those individuals who have completed their schooling by the 1980 interview date and who were not in the military. In addition, these individuals had to have wage observations at both the 1980 and the 1983 interview dates. This restriction does not imply that the respondent had to be working at the interview date since this wage data is wages in current or last job over the survey year.

IV. Results

In addition to the training variables in equations 1 and 2, the determinants of the log wage of young workers will also include factors such as personal characteristics and local demand conditions. These variables include the local unemployment rate, whether or not the respondent lives in a city, marital status, race, sex, whether or not they are covered by a collective agreement, and health. Equation 1 in Table 3 presents results from a standard Mincer type of wage equation excluding the training variables. Equations 2 and 3 in Table 3 include the training variables in the two forms described in the

text. Both of these equations show the significant role that training plays in wage determination. Spells of general training and apprenticeship training acquired before the current job raise wages significantly. Weeks of company training and apprenticeship with the current employer also raise wages. It might be argued that the training variables measured in the NLS capture formal training but not informal on-the-job training. If this is the case then the tenure variable will pick up not only a "tenure" effect but also this informal training. As shown in Table 3, while significant, the size of the tenure effect is much smaller than the training effects. The findings also suggest that training is a more important source of wage growth than other factors including schooling.

Some of the more interesting results in Table 3 are the variables that are not significant. Specifically, spells of OJT acquired before the current job have no effect on wages with subsequent employers. This suggests that OJT is not portable from employer to employer for young workers. In other words, company training is quite firm specific for young workers rather than general. Lester (1954) gives some insight into this finding with a quote from an employer on young workers: "We would rather hire a young man with no moulding experience and train him ourselves, than to hire a man with moulding experience from another firm and have to break him of acquired habits and really retrain him."[4] Previous weeks of general training have a significant and positive impact on wages, however, weeks in general training during current employment are not significant. This may be because current general training is training to allow the respondent to move to a different job where it would be more relevant.

Table 4 presents the findings from the specification of equation 2 of Table 3 but broken down by various sub-samples of interest. There are some

interesting differences across these groups. Mincer (1983) has discussed the potential impact of unions on wage profiles and job training. He finds some evidence, using data from the NLS young mens cohort, that while unions raise the wage of their members, the wage profiles of union workers are flatter than that of their nonunion counterparts. He concludes that there is a higher rate of return to on-the-job training for nonunion workers than for union workers. The results presented here confirm those findings. The union wage premium for the sample as a whole is approximately twenty percent. However, the equations in Table 4 show that the nonunion workers' wages rise much faster during training spells than union workers' wages. Another finding is how having ever been in an apprenticeship (APPT dummy) affects wages. There is a significant positive effect for this dummy variable for white males and union workers while it is significant but negative for black workers. When the sample is split by educational achievement it appears that company training and tenure on the job are very important for high school graduates, while general training and total work experience are much more important for those who remain in school beyond high school.

Before reaching any final conclusions on the basis of results presented in Tables 3 and 4 it is necessary to discuss possible sources of bias in the training estimates due to sample selection. It may be the case that employers only place employees in training programs who have some unobservable characteristic, "trainability". Or, employers may only put workers into jobs which have a significant training component when they decide the worker is a good match. In either case the estimated coefficient on the various training variables will be biased upwards (i.e. a "treatment" selection problem). However, in Table 3, if there is some unobservable characteristic called "trainability" one would expect that previous spells of OJT would capture

that. This variable, however, is never significant. If there is a job matching story behind who receives training one would also expect that the various training dummies would be significant, yet they are not. The problem of treatment selection, therefore, may not be as critical for young workers receiving private sector training as it is for older workers or those on government training programs. Nevertheless, I have attempted to control for this type of sample selection. Assume that:

$$\log \text{wages} = X'B + a, \text{training} + e$$

$$\text{training}^* = a'v + w$$

We observe training only if training* > 0. Training* is greater than 0 due to a firm's decision to invest in an individual's training which in turn may be a function of the individual's observed characteristics and/or perceived match quality or trainability.

In Table 5 I present various estimates of the probability of individuals to receive different types of training. Being a white male significantly raises the probability of receiving apprenticeship training or OJT. A high local unemployment rate raises the probability of a youth receiving general training outside the firm and lowers the probability of receiving OJT. A surprising result is that schooling does not significantly raise the probability of receiving training. It appears that for young workers in the 1980's that schooling and training are not complements and may even be substitutes. Using the probit estimates from the OJT equation I re-estimated equation 2 in Table 3 following a Heckman procedure. These results are presented in equation 4 in Table 5. The results are very similar to those presented in Table 3.

Finally, to control for unobserved individual characteristics that remain constant over time, I estimated a fixed effects model of wage growth for the respondents' wages between the 1980 and the 1983 interview dates. An

individual's wage at time t can be expressed as follows:

$$\log (w_{i\,t}) = (X'B)_{i\,t} + f_i + u_{i\,t}$$

where X' is a vector of individual characteristics that vary over time, and f_i are all of those characteristics which are individual specific but time invariant. These time invariant characteristics would include unobserved factors such as ability. Therefore, in this model, by differencing individuals' wages between 1980 and 1983 all time constant effects will drop out leaving only time varying variables. By estimating a fixed effects model it is possible to control for some of the biases introduced into standard wage equations due to unobserved differences in ability.

The results from this approach are presented in Table 6. In the first column of results for the entire sample, additional weeks of general training acquired outside the firm and apprenticeships significantly raise wage growth. Additional weeks of OJT, however, do not have this same impact. The three union dummies capture the effects of being in a union job at both interviews, moving from a nonunion to a union job, and moving from a union to a nonunion job, respectively. Moving to a union job from a nonunion job has a significant payoff while the opposite significantly reduces wage growth. While increases in tenure with the current employer raise wage growth this effect is still smaller than the effect of weeks of training on wage growth. When the sample is divided into various sub-groups some interesting patterns emerge. Changing union status has the largest impact on white males. Turnover has no effect on the wage growth of women and blacks but a significant and negative effect on the wage growth of white males. Changes in tenure on the job has a much greater impact on the wage profiles of nonunion workers than union workers.

V. Conclusions

The preliminary findings of this paper suggest that private sector training

plays a significant role in the wage determination and career patterns of young workers. Training, especially general training and apprenticeships, raise wages significantly. On-the-job training with the current employer improves wages with the current employer but this type of training seems to be quite firm specific. This lack of portability of on-the-job training for young workers suggests that justifications of employment subsidies to employers to hire young workers that assume that employer provided OJT is portable general training for young workers is misguided. These results also suggest that the assumed complementarity between training and schooling may not be so clear. In fact, for high school graduates there is some evidence which suggests that private sector training plays the role of additional schooling. Training seems to be a significant factor in the determination of the shape of wage profiles. This does not imply that job matching stories are not relevant here, however, changes in productivity on the job seem to be more significant. Finally, the training experience of young workers varies significantly between males and females and blacks and whites. These differences will be explored in more detail in future work.

Footnotes

[1] I would like to thank participants of seminars at Northwestern, M.I.T., Boston University, and the NBER for helpful comments on a previous draft.

[2] David Kearns, CEO Xerox Corp. in W. Miller "Employers Wrestle with Dumb Kids", Industry Week, July 4, (1988)

[3] The data for the training history come from date on starting and ending spells of training by source. These dates are month and year. In order to match this to the weekly labor market status and schooling histories I assume that all training commences and ends at the beginning of the month. In the case of a spell which has the same beginning and ending month I make the ending week the first week of the following month. If many spells of training were quite short in duration this approximation might be inadequate. However, all training spells that are measured in the NLS have to be a minimum of a month in duration to be observed.

[4] R. Lester, Hiring Practices and Labor Competition, Princeton Univeristy Industrial Relations Section, 1954, p. 36.

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Table 1: Examples of "Training Questions"

Study:

Brown (1983), Data - PSID 1976-1980

"On a job like yours, how long would it take the average person to become fully qualified?"

Mincer (1983), Data - PSID 1976-1978, NLS 69, 71 Young & Older Men

NLS - "Do you receive or use additional training (other than schooling training) on your job?"

PSID - "Are you learning skills on the current job which could lead to a better job or promotion?"

Lillard and Tan (1986), Data - CPS Jan. 1983, NLS (Young & Older Men, Young Women, EOPP 1980

CPS - "What training was needed to get the current or last job and what training is needed to improve skills on current job?"

NLS - "What was the longest type of training you have had since the last interview?"

EOPP - "Describe up to 4 training events occurring between Jan 1 1979 and the interview date in 1980 (approx 1 1/2 years)"

Barron et. al. (1987) - Data - EOPP Employer survey

"Number of hours typically spent by a new employee in the position last filled watching other people doing the job rather than doing it himself during the first 3 months of employment"

"Number of hours a new employee in the position spends in formal training"

Table 2: Mean Sample Charateristics (unweighted)

Variable Name		Variable Name	
Male	55%	1983 Unemployment Rate	9.89%
Black	21%	SMSA	72%
School	12.12 years	Healthy	95%
Tenure '83	101.11 wks	Married	30%
Work exp	192.89 wk		

Variable	All	White Males	White females	Blacks
Wage 80	$3.93	$4.36	$3.56	$3.80
Wage 83	$5.10	$5.73	$4.67	$4.68
No. with OJT	134	79	40	15
No. with GT	462	181	192	89
No. with APPT	55	42	9	4
Duration of OJT	30.72	34.18	25.00	27.73
Duration of GT	40.69	43.38	39.71	38.43
Duration of APPT	63.11	74.05	18.78	48.00
No. of observations	3183	1373	1144	666

Table 3: Determinants of log wages at 1983 interview date (All=3183)

Variable	Eq. 1	Eq. 2	Eq.3
Tenure (wks)	0.0006 (5.63)	0.00067 (5.95)	-
Tenure-wks train	-	-	0.00067 (5.95)
Work experience (wks)	0.0018 (11.72)	0.0017 (11.41)	0.0017 (11.41)
Prev. GT (wks)	-	0.002 (3.37)	0.002 (3.37)
Prev. OJT (wks)	-	-0.0005 (-0.30)	-0.0005 (-0.30)
Prev. APPT (wks)	-	0.004 (2.85)	0.004 (2.85)
School (years)	0.04 (9.13)	0.04 (8.93)	0.04 (8.93)
D_1*Curr OJT (weeks)	-	0.002 (1.90)	0.003 (2.40)
$(1-D_1)$*Curr OJT (weeks)		0.003 (1.47)	0.003 (1.86)
D_2*Curr APPT (weeks)		0.004 (2.85)	0.003 (2.15)
$(1-D_2)$*Curr APPT (weeks)		0.002 (1.61)	0.002 (1.56)
Current GT (weeks)		0.00 (0.02)	0.00 (0.02)
OJT Dummy (if OJT then=1)		0.05 (1.05)	0.05 (1.05)
GT Dummy (if GT then=1)		-0.002 (-0.08)	-0.002 (-0.08)
APPT Dummy (if APPT then=1)		0.06 (0.80)	0.06 (0.80)
R squared	.256	.27	.27

Other variables included in estimation - constant, local unemployment rate, number of job changes, and dummies for SMSA, male, nonwhite, health, married, and union.

Table 4: Determinants of log wages at 1983 interview date

Variable	White males N=1373	White females N=1144	Blacks N=666	Union N=573	Nonunion N=2610
Tenure (wks)	.0005	.0007	.001	.0007	.0006
	(2.73)	(4.32)	(4.02)	(3.13)	(5.06)
Work experience	.002	.001	.001	.001	.002
	(8.99)	(5.66)	(3.46)	(3.72)	(10.76)
Prev. GT	.001	.002	.004	-.001	.002
	(0.85)	(2.54)	(2.63)	(-0.89)	(3.75)
Prev. OJT	-.001	-.001	-.001	-.001	-.001
	(-0.54)	(-0.17)	(-0.28)	(-0.52)	(-0.51)
Prev. APPT	.003	-.016	.008	.002	.006
	(1.59)	(-0.68)	(2.27)	(1.08)	(1.71)
School	.04	.043	.03	.04	.04
	(5.80)	(6.12)	(2.92)	(3.31)	(8.40)
D_1*Curr OJT	.003	.003	-.005	.001	.003
	(1.44)	(1.20)	(-0.57)	(0.31)	(1.71)
$(1-D_1)$*Curr OJT	.001	.002	.016	-.003	.005
	(0.69)	(0.24)	(0.84)	(-0.86)	(2.21)
D_2*Curr APPT	.0006	-.05		-.001	.004
	(0.43)	(-1.41)		(-0.79)	(2.19)
$(1-D_2)$*Curr APPT	.00	-.007		-.002	.003
	(0.00)	(-0.34)		(-0.88)	(1.75)
Current GT	-.003	.001	.0002	-.004	.001
	(-1.75)	(1.33)	(0.12)	(-1.74)	(0.71)
OJT Dummy	.07	.03	-.02	.05	.09
	(1.10)	(0.29)	(-0.07)	(0.58)	(1.55)
GT Dummy	.04	-.004	-.04	.11	-.02
	(0.83)	(0.10)	(-0.62)	(1.56)	(-0.68)
APPT Dummy	.21	.15	-.46	.42	-.10
	(1.94)	(0.29)	(-1.77)	(2.96)	(-0.91)
R squared	.29	.22	.23	.31	.22

Other variables included in estimation - constant, local unemployment rate, number of job changes, and dummies for SMSA, male, nonwhite, health, married, and union.

Table 4 cont. Determinants of log wages at 1983 interview date

Variable	< H. School N=766	High school N=1857	> H. School N=899
Tenure (wks)	.0004	.0008	.0006
	(1.81)	(5.95)	(2.64)
Work experience	.0016	.0015	.002
	(5.36)	(7.72)	(6.97)
Prev. GT	.003	.002	.003
	(1.96)	(2.54)	(2.46)
Prev. OJT	-.006	-.002	.001
	(-1.18)	(-0.99)	(0.55)
Prev. APPT	-.005	.004	.007
	(-0.94)	(2.13)	(2.30)
D_1*Curr OJT	-.006	.003	.003
	(-1.25)	(1.66)	(1.45)
$(1-D_1)$*Curr OJT	.003	-.0005	.008
	(1.18)	(-0.22)	(1.13)
D_2*Curr APPT	-.002	.001	.004
	(-0.58)	(1.00)	(1.55)
$(1-D_2)$*Curr APPT		.001	.04
		(0.80)	(1.33)
Current GT	-.003	-.0005	.001
	(-1.04)	(-0.46)	(0.95)
OJT Dummy	.06	.11	-.03
	(0.53)	(1.81)	(-0.30)
GT Dummy	.03	-.0004	-.06
	(0.44)	(-0.01)	(-0.93)
APPT Dummy	.47	.09	-.19
	(2.52)	(0.95)	(-0.92)
R squared	.24	.30	.21

Other variables included in estimation - constant, local unemployment rate, number of job changes, and dummies for SMSA, male, nonwhite, health, married, and union.

Table 5: Probits for the Probability of Receiving Training by 1983

Variable	Apprentice Probit	GT Probit	OJT Probit
Constant	-6.39	-5.56	-2.64
	(-6.00)	(-6.10)	(-5.71)
Male	1.25	-0.35	0.25
	(3.47)	(-3.50)	(2.88)
Black	-1.27	-0.07	-0.34
	(-2.40)	(-0.54)	(-2.74)
Tenure	-0.001	-0.002	-0.001
	(-0.60)	(-2.50)	(-1.39)
Work Experience	0.004	0.017	0.003
	(1.30)	(1.70)	(3.77)
School	-0.01	0.02	0.04
	(-0.11)	(0.67)	(1.43)
Union	0.93	0.04	0.37
	(3.10)	(0.31)	(3.79)
Unemployment Rate	-0.01	0.02	-0.02
	(-0.25)	(2.0)	(-1.83)
Marry	-0.31	-0.27	0.20
	(-0.03)	(-0.24)	(2.26)
Turnover	0.11	0.004	0.007
	(2.75)	(0.20)	(0.44)
Log Likelihood =	-254.26	-1308.09	-518.74

Number of observations = 3183

Table 5 cont. 1983 Log Wage Equation corrected for Sample Selection Bias (using parameter estimates from the OJT Probit)

Variable	Eq. 4
Tenure (wks)	.0007 (5.86)
Work experience	.0016 (9.92)
Prev. GT	.002 (3.38)
Prev. OJT	-.0005 (-0.32)
Prev. APPT	.004 (2.85)
School	.04 (8.70)
D_1*Curr OJT	.002 (1.91)
$(1-D_1)$*Curr OJT	.002 (1.41)
D_2*Curr APPT	.002 (1.60)
$(1-D_2)$*Curr APPT	.001 (1.03)
Current GT	.00004 (0.02)
OJT Dummy	.10 (0.31)
GT Dummy	-.23 (-0.08)
APPT Dummy	.07 (0.81)
Lambda	-.02 (-0.15)

Other variables included in estimation - constant, local unemployment rate, number of job changes, and dummies for SMSA, male, nonwhite, health, married, and union. (Corrected standard errors)

Table 6 Fixed Effects estimates of the change in log wages 1980-83

Variable	All	White males	White females	Blacks	Union	Nonunion
ΔWexp	.00001	.00002	.000008	.000008	.00001	.00001
	(5.87)	(5.30)	(2.25)	(1.46)	(2.76)	(5.09)
Uniond1	-.0003	-.0007	-.0003	.0004		
	(-1.23)	(-1.71)	(-0.59)	(0.74)		
Uniond2	.0007	.001	.0007	.0001		
	(2.66)	(2.98)	(1.61)	(0.21)		
Uniond3	-.002	-.002	-.001	-.0006		
	(-7.28)	(-6.42)	(-3.46)	(-1.24)		
ΔTurnover	-.00006	-.0001	.000002	.0001	-.0001	-.00005
	(-1.48)	(-2.44)	(0.04)	(0.92)	(-0.87)	(-1.07)
ΔPrevious OJT	-.00001	-.00001	.00	-.00006	-.00005	.000003
	(-0.49)	(-0.43)	(0.01)	(-1.06)	(-1.39)	(0.14)
ΔPrevious GT	.00003	.00003	.00003	.00007	.00007	.00004
	(5.30)	(2.37)	(3.46)	(4.08)	(3.57)	(4.91)
ΔPrevious APT	.00004	.00004	.0001	-.0002	.00002	.00006
	(2.61)	(2.62)	(1.44)	(-1.40)	(1.56)	(2.14)
ΔPresent OJT	.000003	-.000002	.00001	.00001	-.00001	.00001
	(0.29)	(-0.16)	(0.85)	(0.19)	(-0.39)	(0.50)
ΔPresent GT	.000002	-.000003	-.000002	.000002	.00	-.000004
	(0.30)	(-0.21)	(-0.20)	(1.07)	(1.92)	(-0.48)
ΔPresent APT	.00001	.00001	-.0002	-.0008	.00001	.000002
	(0.92)	(0.80)	(-1.67)	(-1.38)	(1.27)	(0.15)
ΔTenure	.000004	.000004	.000005	.000006	-.000001	.000006
	(3.52)	(1.89)	(2.81)	(1.92)	(-0.35)	(4.12)
R squared	.06	.09	.05	.05	.05	.04

Table 6 cont. Fixed Effects estimates of the change in log wages 1980-83

Variable	Less than H. School	High School	More than High School
ΔWexp	.00001 (3.31)	.00001 (4.19)	.00001 (2.46)
Uniond1	-.0004 (-0.62)	-.0001 (-0.34)	-.0007 (-0.96)
Uniond2	.0006 (1.10)	.0009 (2.63)	.0001 (0.27)
Uniond3	-.002 (-3.39)	-.002 (-6.58)	-.001 (-2.63)
ΔTurnover	-.0001 (-1.05)	-.0001 (-1.76)	-.0001 (-0.97)
ΔPrevious OJT	.00001 (0.18)	-.00002 (-0.73)	.000005 (0.12)
ΔPrevious GT	.00005 (2.98)	.00005 (5.40)	.00002 (1.56)
ΔPrevious APT	.00007 (1.59)	.00004 (2.06)	.00003 (1.20)
ΔPresent OJT	.00001 (0.66)	.00 (0.04)	-.000003 (-0.14)
ΔPresent GT	.00002 (0.69)	.00 (0.0)	.000004 (0.28)
ΔPresent APT	-.00002 (-0.76)	.00001 (1.26)	.00001 (0.44)
ΔTenure	.000002 (0.70)	.000005 (3.05)	.000004 (1.52)
R squared	.06	.08	.03